# CEVE 405 STEEL DESIGN
# SYLLABUS

## Spring 2017

CEVE 405 is a first course in the design of steel structures, mostly related to building structures but will touch on bridge design as well. Concepts and material routinely used in professional structural engineering design practice of steel members, connections and assemblies will be presented as well as the behavior of members as related to design. Specific objectives and expected learning outcomes of the course are as follows:

- Understand the role and responsibilities of the structural engineer in a design project.
- Become familiar with codes, standards, and specifications commonly used in structural design mainly for buildings but also for bridges.
- Learn the types of loads used for buildings design. Become familiar with bridge loading as well.
- Learn the common types of structural steel and structural steel products used in building and bridge design.
- Understand basic behavior and failure modes for simple structural steel members and connections.
- Be able to design simple structural steel members in tension, compression, flexure and shear and their connections (bolted and welded).

**Instructor:** Nestor R. Rubiano, PhD, P.E.
Email address: nrubiano@rice.edu

**Class Meeting Times:** Tu, Th 5:10 – 6:25 pm
All meetings will be in Room AEL A121

**Campus Office Hours:** Tu, Th 4:10 – 5:10pm, 6:25 – 6:55pm
Room AEL A121

Other times by appointment

**Prerequisites:** Required - CEVE 311 (Mechanics of Solids and Structures)
Preferred - CEVE 304 (Structural Analysis I)

**Books:** Required - Steel Construction Manual, 14th Edition, American Institute of Steel Construction (Instructions will be provided on how to purchase this book at the student discount price)

Recommended - Steel Structures – Design and Behavior Emphasizing Load and Resistance Factor Design, Salmon, Johnson and Malhas, 5th Edition

**Topics** (and approximate number of lectures per topic)**:**

1. Introduction to Steel Design (4): The Design Process; Loads on Structures; Design Formats: ASD vs. LRFD; Structural Steel Properties.

2. Tension Members (3): Modes of Failure; Effective Net Areas; Block Shear; Design Criteria.

3. Bolted Connections (3): Types of Bolts and Bolted Connections; Modes of Failure for Bolts and Bolted Connections; Design Criteria.

4. Welded Connections (3): Arc Welding Processes; Types of Welds; Welding Symbols; Failure Modes for Welds and Welded Connections; Design of Simple Welded Connections.

5. Compression Members (5): Euler Column Buckling Theory; Effects of Residual Stresses; Elastic and Inelastic Column Buckling; Effective Length; Column vs. Frame Instability; Design Criteria.

6. Beams (4): Review of Elastic Bending Theory; Fully Plastic Moment; Local and Lateral Torsional Buckling; Shear Strength; Introduction to Composite Beams; Design Criteria.

7. Additional advanced topics as time permits

## Grading and Rice Honor Code Principles:

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| Exam I | = 17.5% |
| Exam II | = 17.5% |
| Final Exam | = 25% |
| Homework | = 25% |
| Project | = 15% |

Tentative dates for exams (actual dates may vary depending on progress on lectures and homeworks):

Exam I – Tuesday February 14, 2017
Exam II – Tuesday March 30, 2017

Grades on homework will be based both on correctness of the solution and on the quality of presentation of the calculations. Late homework will not be accepted. These are some guidelines for homework:

- Use engineering paper.
- Calculations should be neat and orderly. All work should be in pencil.
- Show enough calculations so that the grader can easily follow what you have done.
- Drawings and sketches should be neat; use a straightedge.
- Clearly indicate your final answer (underline or place a box around the answer)

Attendance is not used in the calculation of the course grade. However, attending all class periods is highly encouraged.

Exam I, Exam II and Final Exam must be taken in order to obtain a passing grade in the course. Exams can be prepared in groups and old exams can be reviewed, but all exams will be taken individually. Make-up exams will not be given without approval from the instructor prior to regular exam.

## Typical Class Schedule

1. Submit homework due, if any
2. 15-20-minute lecture discussion – questions and answers
3. 20-30-minute featured topic lesson
5. 30-40 minute interactive classwork

Out of respect to fellow students and the instructor, please avoid coming late to class.

## Undergraduate Drop Policy:

Please refer to the official Rice University undergraduate course drop policy.

## Final Exam:

Please confirm date, time and location of final examination according to the official schedule of final exams published near the end of the semester.

## Final Letter Grades:

Final letter grades for the course will use the +/- systems and will be assigned according to the following scale:

90-100 = A  80-89.9 = B  70-79.9 = C  60-69.9 = D  <60 = F

Plus and minus grade cut-offs will be determined based on the actual grade distribution.

## Course Website

Selected course information will be posted using the Owl-Space System. Information posted on this site will include copies of class handouts, homework assignments, solutions to homework assignments, and other items. Please refer to this website on a regular basis.

## Additional Information:

Any student with a disability that requires accommodation is encouraged to contact both the course instructor and the Disability Support Services in the Allen Center.

Information contained in this course syllabus, other than the absence policies, may be subject to change with reasonable advance notice, as deemed appropriate by the instructor.